

THE BIONOMICS OF TWO SPECIES OF *HYDROCHARA*
(COLEOPTERA: HYDROPHILIDAE) WITH
DESCRIPTIONS OF THEIR LARVAE

JAMES F. MATTA

Department of Biological Sciences, Old Dominion University, Norfolk,
Virginia 23508.

Abstract.—The habitat, periods of larval and adult occurrence, and possible larval food sources are described for two species of *Hydrochara*. Larvae and adults of *Hydrochara occulta* (d'Orchymont) were found to inhabit *Spartina patens* (Ait.) Muhl. salt marshes, while *Hydrochara soror* Smetana larvae and adults were found in a variety of non-salt marsh habitats. In addition the larvae of the two species are described.

In his world revision of the *Hydrochara*, Smetana (1980) states that the larvae of only three species (*Hydrochara caraboides* (Linnaeus), *H. affinis* (Sharp), and *H. obtusata* (d'Orchymont)) are known. Of these only one, *H. obtusata*, is found in the Nearctic Region. The larva of this species has been discussed by several individuals (Bowditch, 1884; Wickham, 1895; Richmond, 1920; Wilson, 1923; Bertrand, 1972), and Richmond (1920) presented an extensive discussion of larval life history for *H. obtusata*.

During recent studies on the aquatic insects of Parramore Island, a barrier island on the Virginia eastern shore, two species of *Hydrochara* were found to maintain breeding populations. The larvae of these two species (*H. occulta* (d'Orchymont) and *Hydrochara soror* Smetana) and their habitats are described.

The larvae of the two species were not reared; however, larvae were collected in association with adults, and there appears to be little or no 'cross contamination' of habitat by these two species. Adults were never collected outside of their preferred habitat on Parramore Island, and *H. occulta* was not collected from the Dismal Swamp. While rearing is the preferred method of associating larvae with adults, the habitat distinctions appear to be clear-cut enough in this case to warrant the association.

Hydrochara soror Smetana

BIONOMICS

Larvae and adults of this species were found in freshwater woodland pools and were not as abundant on the island as *H. occulta*. *Hydrochara*

soror was also found in abundance in other woodland habitats in the tide-water area, and larvae and adults of this species have been collected routinely from open, woodland pools in the Dismal Swamp, Virginia.

Adults have been collected during all seasons of the year, but they were most abundant from late spring to fall. First-instar larvae have been collected as early as mid-April and mature third-instar larvae have been collected as late as mid-July. Adults are most abundant in heavily shaded woodland pools and backwaters, and larvae have been collected under these conditions on Parramore Island. In the Dismal Swamp, larvae are much more abundant in large, open temporary pools which form in relatively unshaded areas (old field or burn areas). There the larvae are usually associated with clumps of grass or other vegetation with stems hanging in the water. The rarity of the larvae in woodland pools may be an artifact of sampling since it is very difficult to separate larvae from detritus which is invariably associated with woodland pool habitats.

On Parramore Island the woodland pools contain few potential food species of macroinvertebrates other than *Gammarus* sp., *Anopheles* sp., Chironomidae, and larvae of several aquatic Coleoptera including *Hydroporus signatus youngi* Gordon, *Agabus punctatus* Melsheimer, and Helodidae. In the Dismal Swamp a wide variety of macroinvertebrates and amphibian larvae is available as potential prey, including the larvae of over 20 species of aquatic Coleoptera.

LARVAL DESCRIPTION

Last-instar larva.—Overall length 25.0 mm, greatest width of pronotum 3.5 mm. Body, except head and prothorax, dirty brown, slightly lighter beneath, especially on thoracic and 1st abdominal segments.

Head as in Fig. 1. Greatest width of head capsule 3.4 mm. Length 2.3 mm from labroclypeus to occipital foramen; almost rectangular, slightly tapering from base of mandibles to posterior edge. Labroclypeus slightly asymmetrical, right side with teeth projecting slightly anteriorly. Side of labroclypeus with 2 small teeth (not counting tooth at apex). Teeth partially fused in some specimens, particularly on right side, and rarely labroclypeus appears almost semicircular with no distinct teeth. Apex of labroclypeus broadly flattened, slightly concave and indistinctly crenulate, with a slight projection at each end which might be interpreted as a 3rd tooth. Anterolateral projections of epistoma slightly produced, not attaining level of anterior edge of labroclypeus; with 4 or 5 indistinct crenulations.

Ocellar area with 6 ocelli arranged in an ellipse with anterior ocellus larger and subtriangular. Antenna with 1st segment almost 4× as long as 2nd and 3rd together. First antennal segment with inner margin slightly concave; with about 50 strong setae on inner margin which vary in length from $\frac{1}{4}$ to $1\frac{3}{4}$ the width of 1st antennal segment. Outer margin with about 20 irregularly

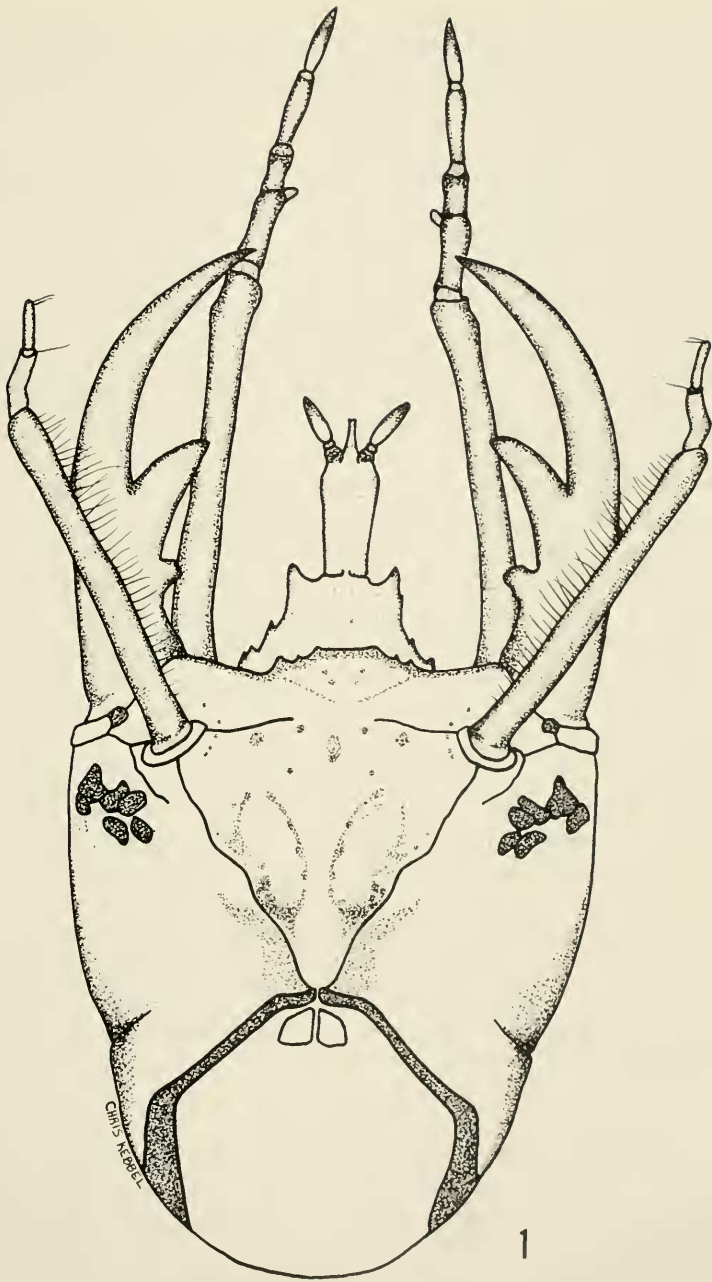


Fig. 1. Head (dorsal view) of *Hydrochara soror*. Line indicates 1.0 mm.

placed, weak setae. Second segment narrower than 1st, slightly curved, with a sensory pit on outer margin at midpoint and a light seta (which is almost as long as last antennal segment) on inner margin at apex. Third segment about half as long as 2nd and about half as wide, with 2 setae on inner margin at apex.

Mandibles large, long and tapering, roughly symmetrical, each with a large median tooth and a smaller, blunt submedian tooth. Teeth of left mandible slightly broader and thicker than right.

Maxillary stipe long and slender, almost as long as mandible, with several irregularly placed weak setae. Palpifer much shorter, less than $\frac{1}{5}$ as long as stipes, with 1 or 2 setae on outer edge anteriorly and a short appendage on inner edge anteriorly. Appendage with a long terminal bristle. Palpus 3 segmented, with 1st segment slightly more than half as long as 2nd. Third segment slightly longer than 2nd, tapering at distal $\frac{1}{3}$ to a rounded tip, with a single seta located basally.

Labrum projecting beyond tip of median mandibular tooth. Mentum (including ligula) and submentum about equal in length. Submentum (best viewed dorsally) roughly pentagonal, with 2 sharp strong denticles distally flanking base of mentum and with 4 smaller denticles on sloping sides. The anterior most of these 4 denticles is extremely minute. Mentum subquadangular, with ligula produced, $2\times$ as long as 1st palpal segment. Labial palpi 2 segmented, 1st segment short, 2nd segment long and slender, $4\times$ as long as 1st.

Pronotum broader than long, sloping laterally, broadly margined, with sagittal line prominent. Sclerotized portion of mesonotum and metanotum reduced to subtriangular sclerites, broader anteriorly, tapering posteriorly with a small transverse sclerite at tip of each triangle. Metanotal sclerites smaller than mesonotal sclerites. Prosternal sclerite large. Mesosternum and metasternum without sclerites.

Legs of similar morphology, 4 segmented, widely separated. Coxae, trochanters, femora, tibiotarsi and claws 1.6, 0.6, 2.0, 1.3, and 0.5 mm in length respectively. Coxae, trochanters and femora with a fringe of fine hairs on upper and lower surfaces. Tibiotarsi with a fringe of stouter hairs on lower surface and with a single large seta on upper inner face at basal $\frac{1}{3}$ and 1 stout seta at apex. Claws single, gently curved with 2 stout setae in basal $\frac{1}{2}$.

Abdomen with 8 distinct segments. Segments 9 and 10 reduced. Segment 1 with a pair of small sclerites dorsolaterally at anterior margin. Segments 1-7 secondarily divided by transverse folds; 2nd fold of each segment bearing 4 setose tubercles. Epipleurite and hypopleurite of each segment (1-7) with a short setose tubercle and the epipleurite with a long setose filament.

Eighth tergum, representing the dorsal valve of stigmatic atrium, bears a

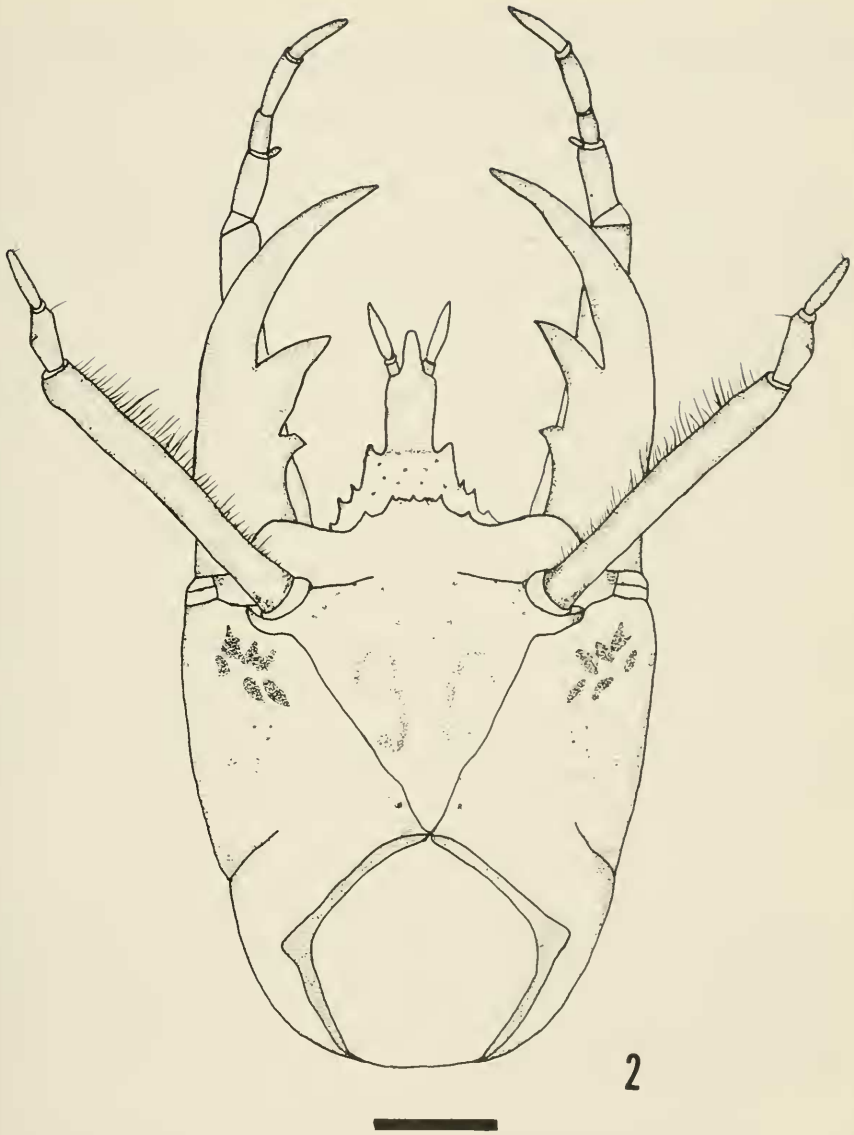


Fig. 2. Head (dorsal view) of *Hydrochara occulta*. Line indicates 1.0 mm.

quadrate sclerotized plate which is usually entire but occasionally projects weakly distally and is rarely notched posteromedially so that rear margin appears bidentate; posterior margin of stigmatic atrium with 6 distinct lobes. Mesocercus prominent and sclerotized, bearing 2 long and 1 short setae;

paracerci less distinctly sclerotized, bearing 2 terminal setae. Posteroventral gill-like appendages as long as the stigmatic atrium (ventromedially).

Hydrochara occulta (d'Orchymont)

BIONOMICS

Adults of this species were found in the low salinity (2 to 12 ppt) *Spartina patens* (Ait.) Muhl. marshes on Parramore Island. They were most frequently encountered in deep ($\frac{1}{2}$ to 1 m), detritus filled sloughs which were heavily shaded with shrubs. Adults were collected during all seasons of the year but were most abundant during late summer and fall.

Larvae were also found in the *Spartina patens* marshes and were usually found clinging to the mat of *S. patens* stems which hang in the water at the margins of the pools. First- and second-instar larvae were collected in late May and mature third-instar larvae were collected as late as mid-July. In the laboratory larvae fed on anything small enough for them to subdue, including mosquito larvae, damselfly larvae, isopods, amphipods, small fish, and amphibian larvae. They rejected hard bodied insects such as adult beetles and some hemipterans. In the field, food available included *Gammarus* sp. and small fish (*Fundulus heteroclitus* (Linnaeus) and *Cyprinodon variegatus* Lacépède) as well as a variety of smaller crustaceans and insects. Other aquatic Coleoptera found in association with this species were the Dytiscidae, *Hygrotus impressopunctatus* (Schaller), *Liodessus affinis* (Say), and *Thermonectus basillaris* (Harris), and the Hydrophilidae *Tropisternus quadristriatus* Horn, *Enochrus hamiltoni* (Horn), and *Berosus fraternus* LeConte. In addition Helodidae larvae were also abundant.

LARVAL DESCRIPTION

Last-instar larva.—Similar to *H. soror*; differing in shape of labroclypeus (Fig. 2) which has a large distinct tooth on side and anterior margin appearing tridentate with middle tooth reduced. Gill-like posteroventral appendages of stigmatic atrium reduced, shorter than ventromedian length of stigmatic atrium. In addition *H. occulta* usually are lighter than *H. soror*, being straw yellow rather than brown.

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